

## **CLAIMS**

What is claimed is:

- 1    1.     A shaped charge comprising:  
2         a charge case;  
3         an explosive charge;  
4         a liner for retaining the explosive charge within the case, the liner comprising:  
5             a substantially contiguous first liner membrane;  
6             a substantially contiguous second liner membrane; and  
7             a particulated filler material disposed between the first and second liner  
8    membranes, which is substantially unconsolidated.
- 1    2.     The shaped charge of claim 1 wherein the liner further comprises a metal cap disposed  
2    upon the first liner membrane.
- 1    3.     The shaped charge of claim 1 wherein the filler comprises powdered metal.
- 1    4.     The shaped charge of claim 1 wherein the filler material is a blend of coarse and fine  
2    particles.
- 1    5.     The shaped charge of claim 1 wherein the first and second liner membranes are  
2    comprised of plastic.

- 1 6. The shaped charge of claim 1 wherein the first and second liner membranes are  
2 comprised of polyester.
- 1 7. The shaped charge of claim 1 wherein the first and second liner membranes are  
2 comprised of fiberglass.
- 1 8. The shaped charge of claim 1 wherein the first and second liner membranes are  
2 comprised of glass.
- 1 9. The shaped charge of claim 3 wherein particles of the powdered metal have a polymer  
2 coating.
- 1 10. The shaped charge of claim 9 wherein the powdered metal comprises aluminum and the  
2 polymer comprises TEFLON®.
- 1 11. The shaped charge of claim 10 wherein the aluminum is passivated by a polymer coating.
- 1 12. The shaped charge of claim 1 wherein the filler material comprises hollow metal pellets.
- 1 13. The shaped charge of claim 1 wherein the filler material comprises glass balloons.

1 14. The shaped charge of claim 1 wherein the filler material comprises nano particles of  
2 material from the group consisting essentially of aluminum, copper, tungsten, copper-coated  
3 tungsten, and TEFLON®-coated aluminum.

1 15. The shaped charge of claim 1 wherein the first and second membranes are contiguously  
2 affixed to one another to completely enclose the filler material.

1 16. The shaped charge of claim 1 wherein the filler material has a density that is below  
2 formation density.

1 17. The shaped charge of claim 1 wherein the filler material has a density that is below 2.7  
2 g/cc.

1 18. The shaped charge of claim 3 wherein the powdered metal comprises tungsten

1 19. The shaped charge of claim 18 wherein the powdered tungsten is coated with copper.

1 20. A shaped charge comprising:  
2 a charge case;  
3 an explosive charge;  
4 a liner for retaining the explosive charge within the case, the liner comprising:  
5 an outer liner membrane; and

6 a filler material disposed encapsulated within the liner membrane, the filler  
7 material having a density that approximates formation density

1 21. The shaped charge of claim 20 wherein the density of the filler material is equal to or less  
2 than, or higher than, 2.7 g/cc.

1 22. The shaped charge of claim 20 wherein the filler material is particulated.

1 23. The shaped charge of claim 20 wherein the filler material comprises powdered aluminum.

1 24. The shaped charge of claim 23 wherein the filler material further comprises TEFLON®.

1 25. The shaped charge of claim 20 wherein the liner has a shape from the group consisting  
2 essentially of conical, cylindrical, trumpet, tulip, ball, and hemispherical.

1 26. A method of perforating a formation comprising:  
2 generating a perforating jet having a metal precursor portion followed by a substantially  
3 particulated portion;  
4 penetrating a wellbore casing with said metal precursor portion;  
5 kissing the formation with said precursor portion; and  
6 penetrating said formation with said particulated jet to form a perforation.

1 27. The method of claim 26 further comprising the step of initiating a secondary detonation  
2 reaction within the formation to open pores within the formation surrounding the perforation.

1 28. The method of claim 27 wherein the step of initiating a secondary detonation reaction  
2 comprises heating air-filled pores in unconsolidated aluminum and rapidly oxidizing  
3 unconsolidated aluminum via proximity of fluorine atoms in a TEFLON® coating.

1 29. The method of claim 26 wherein the secondary burning reaction further comprises  
2 oxidizing aluminum through a TEFLON® coating.

1 30. The method of claim 26 further comprising the step of disposing unreacted polymer  
2 within the formation to reduce fluid viscosity.

1 31. The method of claim 26 further comprising the step of disposing unreacted TEFLON®  
2 within the formation to reduce fluid viscosity.

1 32. An explosively formed penetrator comprising:  
2 a charge case;  
3 an explosive charge within said charge case;  
4 a liner for retaining the explosive charge within the case, the liner comprising:  
5 a substantially contiguous first liner membrane;  
6 a substantially contiguous second liner membrane; and

7                   a particulated filler material disposed between the first and second liner  
8 membranes, the filler material being substantially unconsolidated.

1   33.     The explosively formed penetrator of claim 32 wherein the explosively formed penetrator  
2 further comprises a metal cap disposed upon the first liner membrane.

1   34.     The explosively formed penetrator of claim 32 wherein the liner forming the precursor jet  
2 is conformal to the charge case.